

APPENDIX 1 - THE LETTER & FORM SENT OUT TO MEMBERS OF THE TRANSPORTATION GROUP

M. L. (Mike) Gadd C. Eng., MICE, FIPENZ, Registered Engineer.

MIKE GADD & ASSOCIATES

Civil and Transportation Engineers, 2/63 Rountree Street Christchurch 4
tel/fax (03) 348 - 3710, Mobile 025-376-325



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To all members of the Transportation Group

BENEFITS OF SAFETY AUDIT

I am investigating the benefits of safety audit as a research project for Dr Ian Appleton, Safety Audit Manager, Transfund New Zealand. Out of this general study it is intended to develop statistically reliable methods of assessing these benefits (eg through changes in the crash rate which could be attributable to safety audit).

"Safety Audit" is defined in "Safety audit policy and procedures 1993" (Transit New Zealand) as a formalised process to

- Identify potential safety problems for road users and others affected by a road project; and
- ensure that measures to eliminate or reduce the problems are considered fully

Safety audits can be carried out at any stage from feasibility to pre opening, and the method is now being extended to existing networks.

One of the ways of measuring benefits from safety audit is to find out what effect, if any, safety audit has had on road designers and designs. A draft questionnaire has been developed for trialing amongst a group likely to contain a significant proportion of people involved in road design and construction.

It has been agreed to trial the method using the membership of the Transportation Group. We would appreciate your taking a few minutes to complete the attached questionnaire and returning it in the stamped addressed envelope provided.

It is intended to report on the broad findings of this questionnaire "Roundabout". As always, the value of studies such as this depends on the proportion of filled questionnaires returned so I urge you to fill out and return the accompanying questionnaire, whether or not you are aware of or use safety audit. It is particularly important to know the extent of the use of the method, and people's involvement in safety audits.

I would appreciate your name and organisation but you may feel that for reasons of privacy or commercial sensitivity you would prefer to remain anonymous.

Thank you,

Mike Gadd

Familiarity with and use of Safety Audit - M. L. Gadd 1997

To all members of the Transportation Group. Please complete and return in the stamped addressed envelope. Use a separate sheet if necessary.

FAMILIARITY WITH AND USE OF SAFETY AUDIT

1. Are you aware of Safety Audit? ☐ y/n

2. Are you involved in the geometric design of roads? ☐ y/n

Specifically	Traffic management	<input type="checkbox"/> y/n
	road layouts?	<input type="checkbox"/> y/n
	safety studies?	<input type="checkbox"/> y/n

3. Does your employer use the practice of safety audit ☐ y/n

Specifically	Frequently	<input type="checkbox"/>
	Seldom	<input type="checkbox"/>
	Never	<input type="checkbox"/>
	(Estimate % of jobs)	<input type="checkbox"/>

4. Do you understand the purpose of safety audit? ☐ y/n

5. Have you attended a course on the topic? ☐ y/n

6. Have you been on a safety audit? ☐ y/n

How many? ☐

7. Are you now more aware of safe design practice than before the introduction of safety audit ☐ y/n

8. If the answer to 7. is "y", in what areas (Please state, using the attached list as a reference - or tick the appropriate topics)

.....

.....

.....

9. Are you aware of any shortcomings of the method or its application in New Zealand and have you any suggestions as to how these can be remedied?

.....

.....

.....

10. In your opinion, has safety audit had a beneficial flow-on effect on non-audited schemes? ☐ y/n

I would appreciate your name.....and organisation/location

.....

.....

Thank you. I appreciate your taking the time to complete and return this questionnaire in the enclosed stamped-addressed envelope **Mike Gadd**

APPENDIX 2 - SUMMARY OF COMMENTS ON SAFETY AUDIT

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70 respondents commented, there being 79 comments in total.. These have been collated under the following headings. It is sometimes difficult to know whether the comment concerns client response or the system. Consequently some comments about the client could relate to weaknesses in the system eg lack of formal requirement to report back.

1. POSITIVE COMMENTS ABOUT THE SYSTEM

(9 items)

2. CRITICAL COMMENTS OR SUGGESTIONS ABOUT IMPROVING THE SYSTEM

(34 items)

3. POSITIVE COMMENTS ABOUT TEAM COMPOSITION AND EXPERIENCE

(3 items)

4. CRITICAL COMMENTS & SUGGESTIONS ABOUT TEAM COMPOSITION & EXPERIENCE

(23 items)

5. COMMENTS ABOUT THE DESIGNER OR CLIENT

(10 items)

1. POSITIVE COMMENTS ABOUT THE SYSTEM

- 4 We now have a formal safety audit procedure for all roads under Roading Division and for other agency works through traffic management plans.
- 16.1 Safety audit reinforces awareness of topics. As a designer was aware of topics but easily overlooked some during design focus.
- 36 More aware of (a) skid resistance, (b) elimination of wheel spin.
- 65.1 (in answer to q.8) We are now more inclined to use a checklist for the maintenance of safety standards than was the case in the past.
- 79.1 (In answer to q.8) Generally the benefits of systematic (checklist) approach to looking at proposals.
- 98 I am not aware of any shortcomings of the procedure. I have (sic) it satisfactory for the purposes requested.
- 85.2 Feedback assists in not making the same mistake.
- 89.2 (to q 10) Certainly some designers consider the idea what if this scheme is audited.

- 99 The need to keep roadsides clear of traps, eg ditches, culvert headwalls. I think obstacles eg trees, old culvert pipes and traps in the roadside out of the shoulder area are the most frequent hazards commented on.

(Note: I have taken this to be a positive comment as the writer thinks these problems have been identified!)

2. CRITICAL COMMENTS OR SUGGESTIONS ABOUT IMPROVING THE SYSTEM

1. I do unsealed road research and I consider skid resistance not well applied there - too much loose gravel allowed when should be adequately bound wearing course containing appropriate clay binder.
3. Keep it simple - check list plus action taken on problems noted/observed.
5. Check lists are extremely repetitive in the SAPAD 1993 - maybe able to refine these. (They are however, comprehensive.)
- 13.2 All design is a compromise, but trade-offs are not being made eg. safety versus capacity. Intersections are being made "safe" and in the process introducing congestion that was not there before.
14. Need review of policy and procedures.
- 16.3 Design standards need to be reviewed if features regularly identified by safety audit, (eg. road side ditches)
18. Too few audits of existing roads
- 21.2 Lack of adequate time for audit process.
27. In my opinion, it has tended to be reactive. I think it should be an input into determining the extent of a road problem and thereby assist in determining the project length, ie. up the front and of an I and R. (Investigation and research, does that mean - MLG)
34. Funding, commitment, education.
- 37.1 TNZ often exclude safety audits from small projects at the scheme stage due to the high cost involved. It should be mandatory that a check list be included in all schemes regardless.
39. There may not be sufficient audits carried out at the very early stage of a project when, say, the alignment is chosen from a number of options.
40. This may not be relevant, but is the accident record (including injuries) measured in safety audit?

- 41. The biggest problem with safety audit is that it could become an alternative to practising safe design in the first instance.
- 42.1 There is no follow-up or recommended changes to the suggestions and hazards identified by the audit. I am referring to contracts carried out by consultants.
(This is a duplicate as it also has elements of client response)
- 42.2 Funding to carry out recommendations is also an issue. In some cases, budget blowouts can result.
- 43. Lack of detailed guidelines for the carrying out of safety audits on existing roads.
- 44. Principles not applied to existing networks on an ongoing basis (ie. safety audit often stops after project is audited rather than there being an ongoing process).
- 49. Some standards are not up-to-date with current practice. We are not good at solving road safety problems, we only move the problem to other sites!
- 56.1 Not used enough - ensure that all TNZ funded schemes (subsidised) have them.
- 59. Local authorities are still not making widespread use as per TNZ State Highway jobs. Transit could demand a more pro-active stance by local authorities before they give them money for projects.
- 60.1 Not yet universal throughout New Zealand.
- 60.2 Lacks funding from central Government.
- 60.33 Benefits are often long term and politicians have difficulty with this.
- 61.1 Funding some of the changes in getting a BC.
- 70.2 Standard requirement by TNZ for certain jobs would ensure uniformity and more use.
- 71. Yes, I am aware of shortcomings. Maybe there could be several levels of safety audit, ie. under \$50,000, over \$50,000, specific projects, ie. traffic signals.
- 73. I believe a high percentage (perhaps all) roading improvement projects should be subject to auditing, even if this only involves changes to road marking (where significant). Even TNZ makes errors here.
- 76. I know of safety weaknesses for cycles and pedestrians, in layouts which have presumably been checked.

- 79.2 Difficult to audit existing urban scene in terms of prioritising potential actions to take.
80. The urban environment with respect to the effect of land constraints - not an easy matter to address in the latter stages.
- 88 Not enough TLAs committed to its use
- 91 Cost of recommendations not evaluated. May be cheaper options. If recommendations are not followed is the owner culpable if there is a future accident?
- 92 Yes, clients and consultants do not provide feedback to Safety Auditors on final decisions made. I believe a meeting between the three should be undertaken to ensure clients make and are aware of the safety aspects when making their decisions to adopt or ignore audit recommendations.

3. POSITIVE COMMENTS ABOUT TEAM COMPOSITION AND EXPERIENCE

- 6.1 (In answer to q.8) Very definitely. By using different auditors, there is an excellent transfer of technology.
- 6/2 By using different auditors, awareness is increased in all topics. By taking part or leading an audit, one must refresh their memory on all current design philosophy which is excellent.
58. None, provided that the road controlling authority sees fit to have a safety audit (this is not always the case, particularly with "minor improvements").

4. CRITICAL COMMENTS AND SUGGESTIONS ABOUT TEAM COMPOSITION AND EXPERIENCE

- 6.1 continued. All auditors have particular hobby horses. Using the same auditor becomes predictable to the designer.
8. Many safety auditors have not actually designed and built anything. Yet, without a knowledge of physical or economic constraints, they judge others' work. Design audits by competent designers may be better.
- 9.1 Need to have more education for safety auditors, perhaps leading to a qualification or membership of an affiliated organisation. Suggest looking at UK practice (Malcolm Bulpit etc. Did they use Road Safety Officers who have the appropriate letters, etc?)

- 9.2 Whilst it is important that Auditors are objective in their reports, I believe they are sometimes over-zealous in putting together a case for making some changes which relies too much on theory and not enough on practicalities, particularly when faced with slightly constrained site. How often have you heard someone say, "It's not the safety auditor's responsibility to fund the solutions, only the problems." Sometimes this boils down to nothing more than the fact that the auditor has to justify his fees. I believe that there is a need for auditors to be held more accountable.
- 13.1 Few skilled geometric designers are available for safety audits. There are some bad geometric designs getting built.
22. Lack of adequate training of investigators. Consistency (eg. some decisions are based on personal opinion.)
28. My role is mostly as client and as such the system is reasonably good - but the effectiveness of audits depends considerably upon the skill base of the auditors. Some are scarcely adequate.
33. The process is at times being used as a quasi design tool. Whilst this is good, auditors must remain independent of this process.
- 35.2 Number in audit team and composition of team, "foggy" aspect - seem to have only two in team (okay for small jobs??)
- 37.2 Safety audit has a beneficial effect but not in general. Highly dependent on individual company.
38. Funding - some form of funding is required to encourage safety audits.
54. The availability and costs for suitable staff (impartial) to be involved in investigation teams, particularly for smaller, local authority projects.
- 56.2 Qualifications would be helpful to ensure it is undertaken by someone of repute.
- 61.2 Still need to expand the pool of auditors.
64. Because the whole process relies on acquired knowledge of what works and what causes problems, we are quickly running out of skill base to undertake safety audits (and maintain a design resource!).
- 65.2 The main shortcoming is that most auditors do not have a technical background in engineering principles. Another is a lack of appreciation of why a project is proposed/implemented. The "risk factor" levels can be (are) often misleading and often condemn a project unjustifiably.
66. Lack of experience of road design among auditors.

- 67. No significant shortcomings if the process is used properly and the auditors are not chosen, "minimum cost" basis and are properly independent of the designers.
- 72. Weightings and seriousness of problems is variable from team to time, ie. somewhat subjective, and often seems to be overstated. For example, many engineers would struggle to defend what they term a "serious problem" in a safety audit as being such in court or in a hearing.
- 85.1 Suggest the use of non-engineers (ie Road safety Officers) to undertake audits. Peer review is more appropriate, and can be in house
- 89 Two major shortcomings or abuses are in house/same office or client based audits which are practiced by some local authorities. Audio teams without the skills (specialised) are required for some types of work. (Query as to meaning - MLG). Use of teams of one or only one skilled person.
- 93 On one of the audits I attended it appeared the team had to make a quantity of points for the sake of the audit rather than the intersection looked at. "to show audit thorough". This can add extra costs and time to projects for questionable benefit.
- 94 Not enough opportunity to observe or take part in safety audits.

5. COMMENTS ABOUT THE DESIGNER OR CLIENT

- 5/2 There is a beneficial effect but only if the designer is directly involved with safety audits.
- 16.2 Yes, more aware, client needs to be seen to be taking responsibility and positive action in keeping designers and auditors informed.
- 21.1 Safety auditors do not get designers' responses and client decisions in many cases.
- 21.3 A problem in response to design and build projects.
- 25 Very long (infinite ?) delay in advising auditor of final decisions.
- 35.1 Auditors rarely see designers' comments or their audits, ie. do not know what problems were addressed and why others were not.
- 42.1 There is no follow-up or recommended changes to the suggestions and hazards identified by the audit. I am referring to contracts carried out by consultants. (This is a duplicate as it also has elements of team actions)

- 45. Need closer liaison between audit team and designer. Some people become personally attached to their design and take audit recommendations as criticisms - not a nice environment.
- 60.4 Client responses seldom communicated back to auditors.
- 70.1 Not always formally reported.

M. L. Gadd

QUESTIONS 1-7 AND 9,10				
Question			totals	%
1. Are you aware of safety audit?	y		92	94
	n		4	4
2. Are you involved in Geom. des. of roads?	y		69	70
	"marginally"		5	5
	n		22	22
Specifically traffic management?	y		65	66
	n		19	19
road layouts	y		67	68
	n		20	20
safety studies	y		59	60
	n		17	17
3. Does your employer use the practice of sa?	y		71	72
	n		8	8
Specifically frequently?			55	56
seldom			17	17
never			7	7
don't know			3	3
estimate % of jobs	%		1726	18
4. Do you understand the practice of sa?	y		91	93
	n		5	5
5. Have you attended a course on this topic?	y		52	53
	n		43	44
6. Have you been on a safety audit?	y		59	60
	n		36	37
How many?			736	8
7 Are you now more aware of safe design practice?	y		66	67
	n		16	16
	Not Sure		5	5
9. Are you aware of any shortcomings of the method	y		52	53
	n		22	22
Any suggestions as to how these can be remedied			50	51
10. Has sa had a beneficial effect on non sa scheme	y		64	65
	n		4	4
	Don't know		10	10

QUESTION 8				
Question			totals	%
1. Changes since previous stages	1a/1		18	18
2. Drainage	2		20	20
3. Climatic conditions	3		9	9
4. Landscaping, general	4		20	20
5. Services - buried and overhead	5		15	15
6. Access to property and development	6		26	27
7. Future widening &/or realignments	7		12	12
8. Staging of scheme	8		13	13
9. Staging of works	9		17	17
10. Significant adjacent developments	10		16	16
11. Batter & fill stability incl. surface effects	11		10	10
13. Geom. of horizontal & vertical alignment	1b/13		35	36
14 Appropriateness of design speed adopted	14		35	36
15. Typical cross sections, adequacy	15		27	28
16. Effect of Cross Sectional Variation	16		19	19
17. Roadway layout for traffic management	17		26	27
18. Shoulders, edge treatment, k'side controls	18		30	31
19. Departure from Standards & Guidelines	19		28	29
20. Visibility, sight distances	20		37	38
21. Signs and markings	21		36	37
22. Surface, skid resistance	22		20	20
23. Contrast with markings	23		14	14
24. Installed hazards	24		28	29
25. Natural features	25		20	20
2/1. Visibility	2\1		27	28
2. Readability by drivers & other users	2		36	37
3. Correctness of speed design	3		25	26
4. New/existing road Interface	4		31	32
5. Relationship to other nearby intersections	5		24	24
6. Layout, geom. des. incl. pavmnt markings	6		35	36
7. Traffic signals	7		21	21
8. Stop and give way signs	8		21	21
9. Roundabouts, islands, ped. refuges	9		26	27
10. Traffic restrs, tr. calming (all roads)	10		31	32
1. Median barriers	3\1		19	19
2. Poles & similar obstructions	2		33	34
3. Guardrailing (vehicle or pedestrian)	3		29	30
4. Bridge & culvert parapets, underp. soffits	4		15	15
5.. Solid Vegetation	5		16	16
6. Verandahs	6		7	7
1. Lighting	4\1		32	33
2. Traffic Signs - pos. & appropriateness, size	2		46	47
3. Other Signs - incl. distractive (non-road)	3		22	22
4. Markers, edge delineation	4		28	29
1. Buildability	5\1		12	12
2. Operation	2		12	12
3. Traffic Management	3		20	20
4. Network Management	4		9	9
5. Temporary traffic control / Management	5		23	23
6. By-law requirements (P)	6		9	9
6. Safety aspects not covered	6\1		1	1

COMPARISON OF GEOMETRY INVOLVED V. NOT INVOLVED

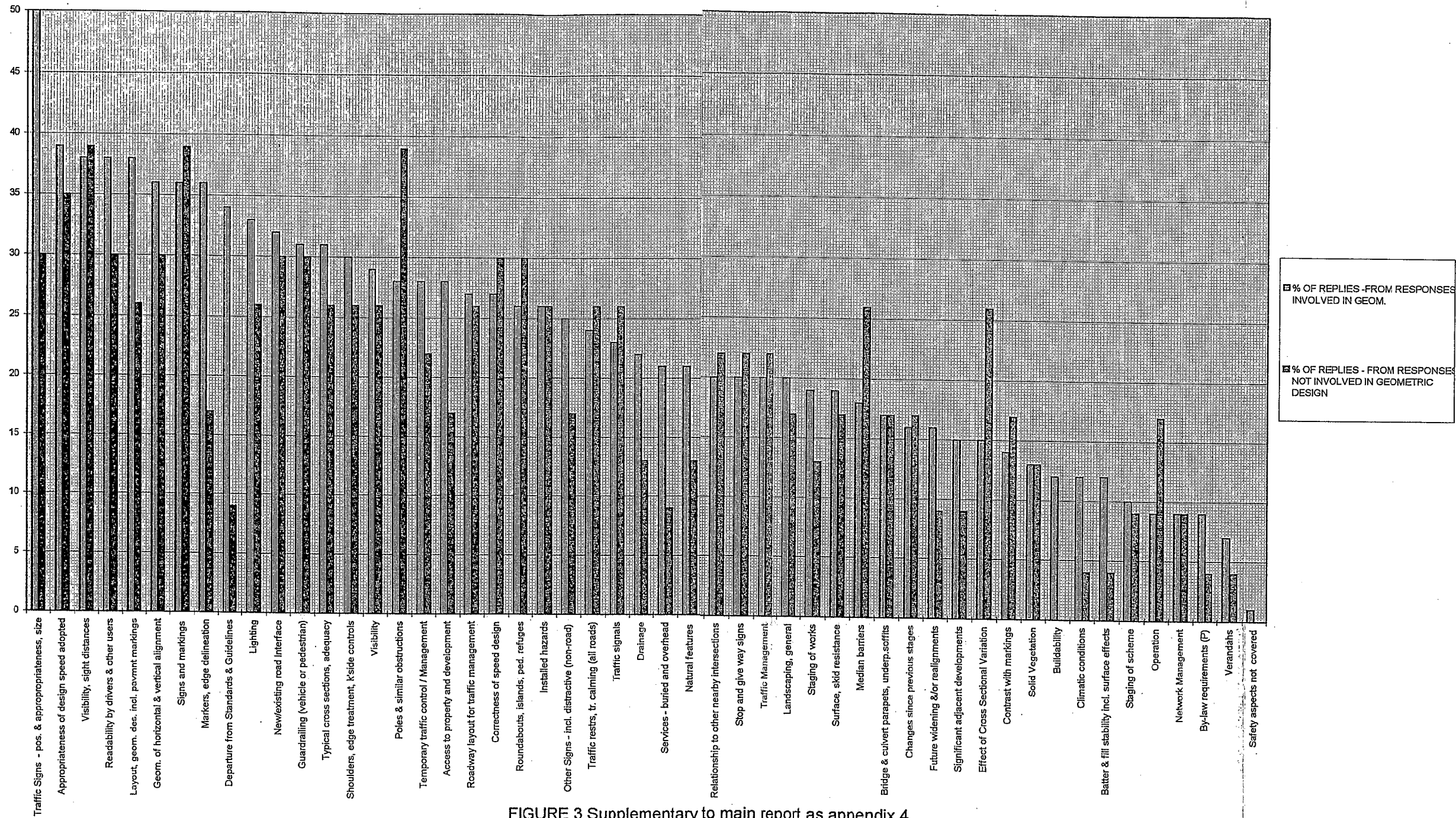


FIGURE 3 Supplementary to main report as appendix 4

